

## Supplementary material: Water masses data

**Table 1. Summary of water masses properties based on data collected during M77, M80 and L'Atalante cruises. Tropical Surface Water (TSW:  $T > 25^{\circ}\text{C}$ ,  $S < 34$ ), Equatorial Surface Water (ESW:  $T < 25^{\circ}\text{C}$ ,  $S > 34$ ), Subtropical Surface Water (STSW:  $S > 35$ ), South Atlantic Central Water (SACW:  $5 < T < 20^{\circ}\text{C}$ ,  $34.3 < S < 36.0$ ), North Atlantic Central Water (NACW:  $7 < T < 18^{\circ}\text{C}$ ,  $35 < S < 36.7$ ), Subtropical Underwater (STUW:  $13 < T < 22^{\circ}\text{C}$ ,  $34.3-35.5$ ),  $13^{\circ}\text{C}$  Equatorial Water (13CW:  $12 < T < 14^{\circ}\text{C}$ ,  $34.8 < S < 35$ ), Antarctic Intermediate Water (AAIW:  $3 < T < 5^{\circ}\text{C}$ ,  $34.4 < S < 34.5$ ), South Pacific Deep Water (SPDW:  $1.2 < T < 2^{\circ}\text{C}$ ), Lower Circumpolar Water (LCPW:  $0.5 < T < 0.9^{\circ}\text{C}$ ,  $S < 34.7$ ), North Atlantic Deep Water (NADW:  $T < 4^{\circ}\text{C}$ ,  $S > 35$ )**

	Water mass		Temperature [ $^{\circ}\text{C}$ ]	Salinity [PSU]	Nitrate [ $\mu\text{mol/l}$ ]	Phosphate [ $\mu\text{mol/l}$ ]	Oxygen [ $\mu\text{mol/l}$ ]	$\delta^{15}\text{N}$ [‰]
Pacific	TSW	Range	20.4–26.1	32.9–34.6	0.8–15.9	0.3–1.4	96.8–233.0	5.7–10.4
		Average	<b>24.1</b>	<b>33.7</b>	<b>6.4</b>	<b>0.7</b>	<b>192.4</b>	<b>8.7</b>
			n=24	n=24	n=19	n=19	n=19	n=5
	ESW	Range	20.2–24.8	34.9–34.2	0.2–18	0.6–1.4	96.8–271.7	5.8–10.7
		Average	<b>22.5</b>	<b>34.6</b>	<b>8.3</b>	<b>0.9</b>	<b>199.6</b>	<b>8.1</b>
			n=43	n=43	n=38	n=38	n=42	n=6
	STSW	Range	23.6–26.8	35.5–35.6	1.4–5.1	0.3–0.7	220.0–244.0	14.6–29.1
		Average	<b>24.9</b>	<b>35.5</b>	<b>3.3</b>	<b>0.5</b>	<b>226.7</b>	<b>18.5</b>
			n=47	n=47	n=28	n=28	n=31	n=10
	STUW	Range	13.0–16.5	34.7–35.0	0.3–33.7	1.1–3.8	1.8–201	1.5–19.4
		Average	<b>13.6</b>	<b>35.0</b>	<b>26.3</b>	<b>2.4</b>	<b>24.0</b>	<b>7.5</b>
			n=374	n=374	n=315	n=317	n=340	n=135
	13CW	Range	12.1–13.9	34.8–35.0	0.0–34.5	1.1–3.9	1.8–74.3	3.8–25.2
		Average	<b>13.1</b>	<b>34.9</b>	<b>23.2</b>	<b>2.6</b>	<b>10.9</b>	<b>9.1</b>
			n=657	n=657	n=526	n=526	n=604	n=207
	AAIW	Range	4.2–6.0	34.5–34.6	42.0–51.6	3.1–3.6	17.9–62.6	5.4–8.4
		Average	<b>4.9</b>	<b>34.5</b>	<b>46.8</b>	<b>3.3</b>	<b>44.2</b>	<b>6.7</b>
			n=134	n=134	n=96	n=95	n=103	n=39
SPDW	Range	1.9–2.9	34.6–34.7	38.2–45.7	2.7–3.2	68.5–136.0	5.1–7.2	
	Average	<b>2.2</b>	<b>34.6</b>	<b>40.5</b>	<b>2.9</b>	<b>106.4</b>	<b>5.8</b>	
		n=73	n=73	n=62	n=62	n=70	23	
LCPW	Range	1.8	34.7	34.9–38.0	2.6–2.7	139.0–158.0	5.1–6.1	
	Average	<b>1.8</b>	<b>34.7</b>	<b>36.6</b>	<b>2.7</b>	<b>148.1</b>	<b>5.4</b>	
		n=21	n=21	n=18	n=18	n=18	n=4	
Atlantic	NACW	Range	9.7–16.8	35.2–36.3	13.4–33.8	0.8–2.0	57.7–135.0	3.4–7.0
		Average	<b>12.7</b>	<b>35.6</b>	<b>26.4</b>	<b>1.6</b>	<b>77.3</b>	<b>5.4</b>
			n=24	n=24	n=17	n=17	n=24	n=16
	SACW	Range	9.7–17.4	35.0–35.8	16.4–37.1	0.8–2.1	52.9–134.2	2.0–7.1
		Average	<b>12.3</b>	<b>35.2</b>	<b>26.7</b>	<b>1.5</b>	<b>101.4</b>	<b>5.3</b>
			n=60	n=60	n=40	n=42	n=60	n=33
	AAIW	Range	5.0–7.2	34.7–34.9	33.9–44.9	1.9–2.4	76.9–140.6	4.8–6.8
		Average	<b>5.8</b>	<b>34.8</b>	<b>38.2</b>	<b>2.2</b>	<b>113.1</b>	<b>5.5</b>
			n=13	n=13	n=10	n=10	n=13	n=8
	NADW	Range	2.5–3.9	34.9–35.0	21.8–23.0	1.4–1.6	220.9–249.1	4.8–5.6
		Average	<b>3.1</b>	<b>34.9</b>	<b>22.5</b>	<b>1.5</b>	<b>238.6</b>	<b>5.3</b>
			n=22	n=22	n=10	n=10	n=10	n=13